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CW/HW 28: Exponential Functions Day 2

**Honors Geometry**

**Toilet Paper Thickness**

A typical thickness of toilet paper is 𝟎. 𝟎𝟎𝟏 inch. This seems pretty thin, right? Let’s see what happens when we start folding toilet paper. How thick is the stack of toilet paper after 𝟏 fold? After 𝟐 folds? After 𝟓 folds?

What is an equation we could write to represent this situation?

|  |
| --- |
| a = pattern/constant ratio  b = y-intercept/initial value/zero-term |

Now that we have a formula . . . the moon is about 𝟐𝟒𝟎, 𝟎𝟎𝟎 miles from Earth. Compare the thickness of the toilet paper folded 𝟓𝟎 times to the distance from Earth.

**Writing Exponential Functions**

1. Roger receives 2 mice as a birthday gift from his parents. Quickly they start to multiply! Each month, he has three times as many mice as he started with. Write the function that models the number of mice after each month.
   1. What is the rate of growth?
   2. How many mice will Roger have after 6 months?
2. Mario receives $20 from his parents for his birthday. He deposits the money in his local bank, and each year his money triples. Write the function that models the amount of money Mario will have after each year.
   1. What is the rate of growth?
   2. How much money will Mario have in his account after 4 years?
3. Chris buys three lizards from the pet store. Each month his lizard population quadruples. Write the function that models the number of lizards after each month.
   1. What is the rate of growth?
4. A rare coin appreciates at a rate of 𝟓. 𝟐% a year. If the initial value of the coin is $𝟓𝟎𝟎. Show the formula that models the value of the coin after 𝒕 years.
   1. After how many years will its value cross the $𝟑, 𝟎𝟎𝟎 mark?
5. Every year, Mikhail receives a 3% raise in his annual salary. His starting annual salary was $40,000. Show the formula that models his salary after years.
   1. What will Mikhail’s salary be after 10 years?
6. Chain emails are emails with a message suggesting you will have good luck if you forward the email on to others. Suppose a student started a chain email by sending the message to 3 friends and asking those friends to each send the same email to 3 more friends exactly 1 day after receiving it.
   1. Write an explicit formula for the sequence that models the number of people who receive the email on the 𝑛th day. (Let the first day be the day the original email was sent.) Assume everyone who receives the email follows the directions.
   2. What is the first day when the number of people receiving the email exceeds 100?
7. A local college has increased its number of graduates by a factor of 1.045 over the previous year for every year since 1999. In 1999, 924 students graduated. What explicit formula models this situation? Approximately how many students graduated in 2014?
8. Miriam and Jessica are growing bacteria in a laboratory. Miriam uses the growth function while Jessica uses the function , where *n* represents the initial number of bacteria and is the time, in hours. If Miriam starts with 16 bacteria, how many bacteria should Jessica start with to achieve the same growth over time?
9. Suppose a ball is dropped from an initial height and that each time it rebounds, its new height is 60% of its previous height.
   1. What are the first four rebound heights after being dropped from a height of ?
   2. Write the function that models the situation.